

PRELIMINARY DATA SUMMARY

May 1986

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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CERC Field Research Facility
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility in Duck, North Carolina. The data were collected and the analyses performed by the FRF staff. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig.1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. Herman C. Miller at (919) 261-3511.

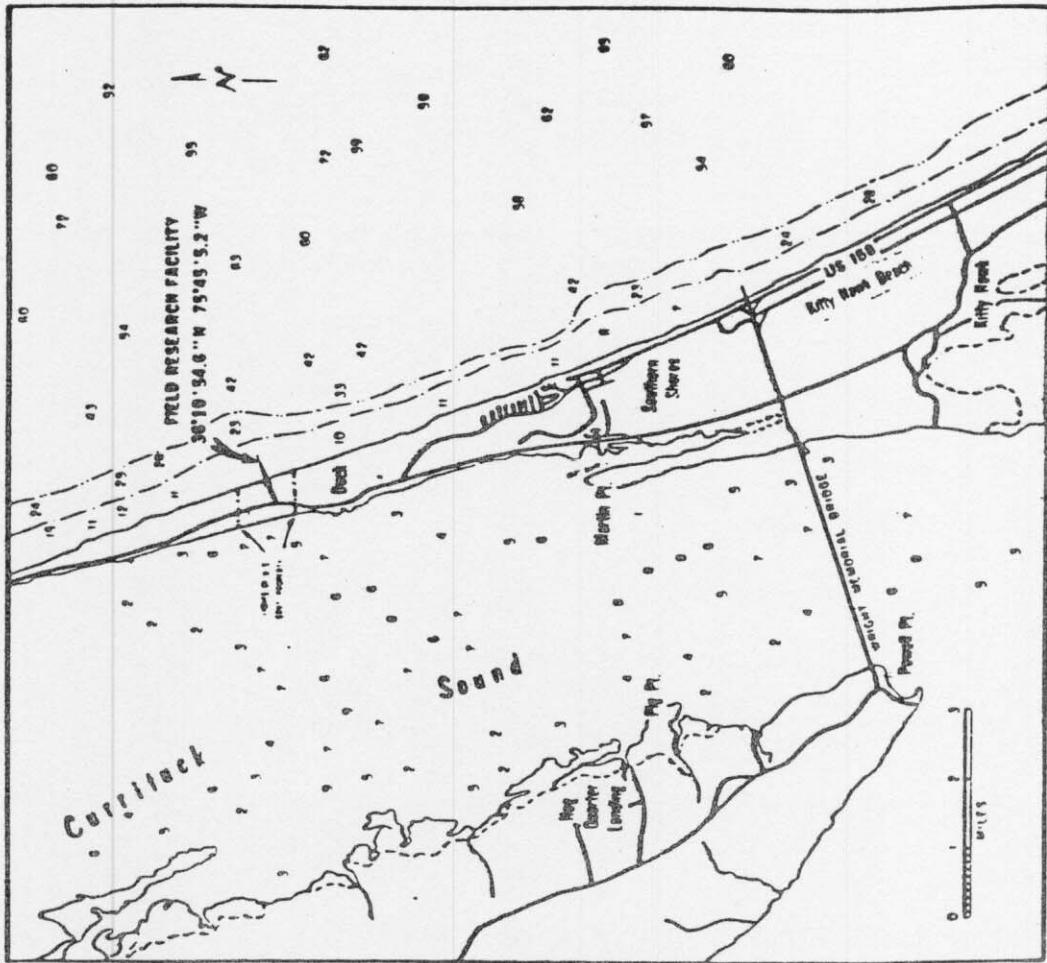
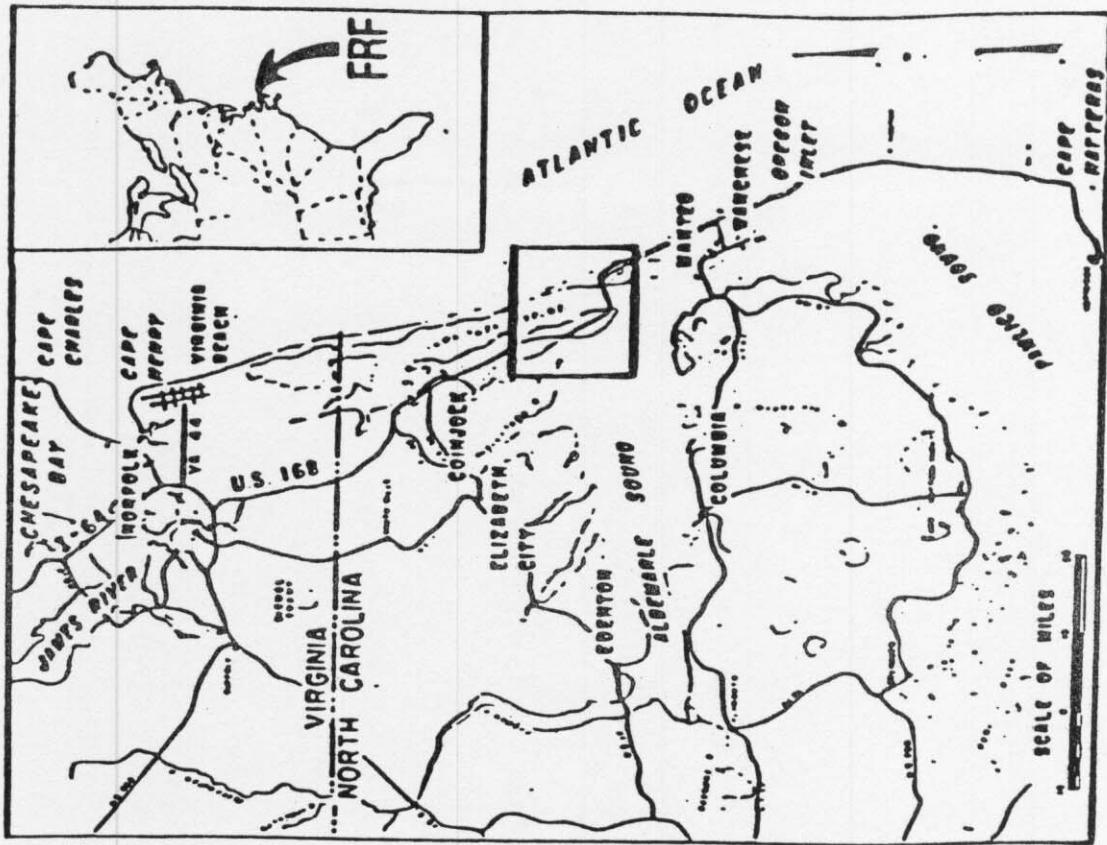


Figure 1. FRF Location Map

TABLE 1
Instrument Status/Data Availability
May 1986

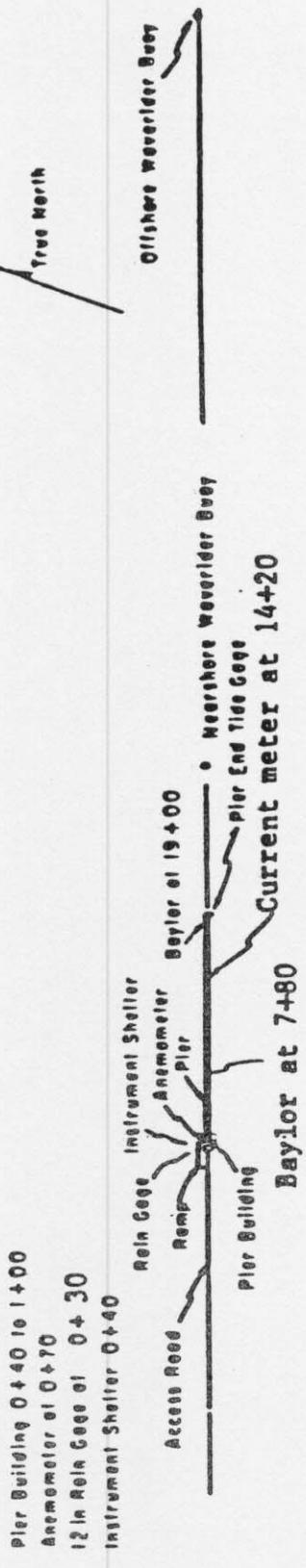
CAGE NUMBER	DESCRIPTION/REMARKS	DEPTH AT SENSOR	DAY OF THE MONTH											
			1/2/3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31	Instrument Status		Data Collected		Analog Record		Instrument Status		Data Collected		Analog Record
	Aerometric Pressure			Operational	Operational	YES	NO	NO	NO	Operational	Operational	NO	NO	NO
	Precipitation			Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
	Air Temperature			Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
	Anemometer on Lab Bluff - Elevation 19m (MSL)			Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
643	Baylor staff located at station 7400 on FRF pier	See profile		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
625	Baylor staff located at station 10400 on FRF pier	See profile		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
640	Waverider buoy located 1.0 km from shore	Approx. 8.3 m. HSI.		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
620	Waverider buoy located 6.0km from shore	Approx. 18 m. HSI.		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
620	Current meter at station 1420 on FRF pier	See profile		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
679	Current meter 300m south (0.3km offshore)	Approx. 6 m HSI.		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO
065-1370	NOAA pressure tide station located at seaward end of FRF pier	Instrument Status Data Collected		Operational	Operational	NO	NO	NO	NO	Operational	Operational	NO	NO	NO

Instrument Status: Operational - Daily Observation: YES . PARTIAL

Data Collected: ALL , SOME

Analog Record: ALL , PARTIAL

Preliminary Analysis: ALL , SOME



• Current meter 500m south of pier

CURRITUCK SOUND

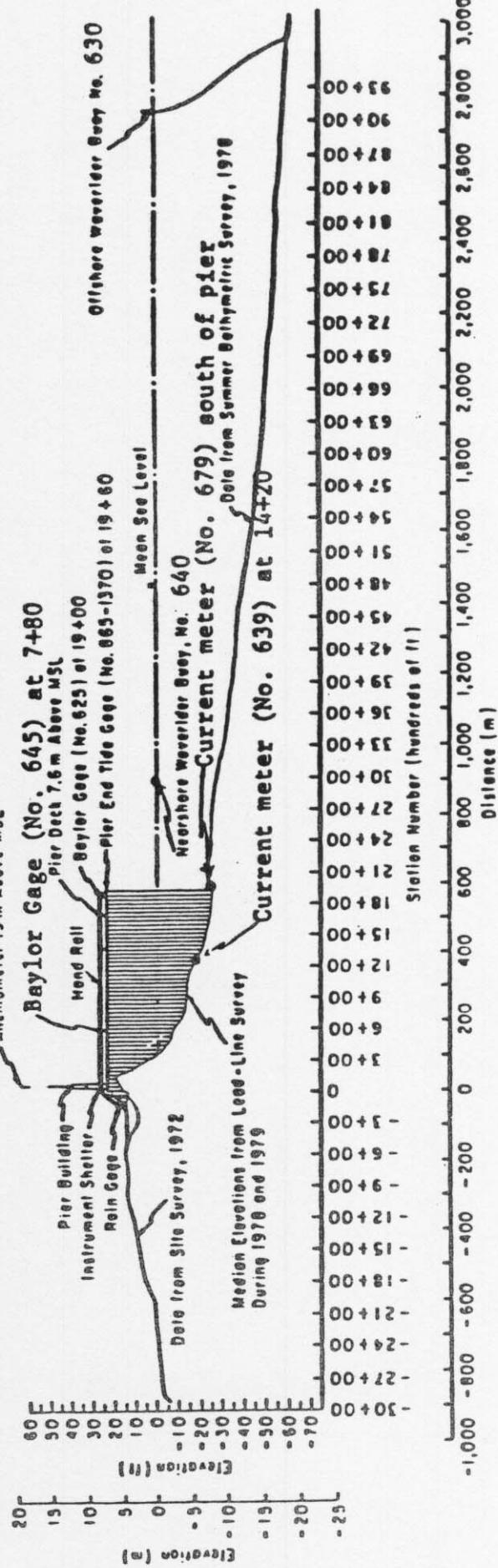


Figure 2. Instrument locations at FRF.

II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
 $mm \times .03937 = in$
2. Millibars (mb) to inches of mercury (in Hg) -
 $mb \times 0.02953 = in Hg$
3. Degrees Celcius (C) to degrees Fahrenheit (F) -
 $(C \times 9/5) + 32 = F$
4. Meters per second (m/s) to knots (kn) -
 $m/s \times 1.943 = kn$

TABLE 2: METEOROLOGICAL DATA

MAY 1986

PART 1

DAY		WIND SPEED HOUR	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	3	202	16.7	1016.9	0
	700	4	221	18.7	1016.1	0
	1300	5	252	27.7	1012.2	0
	1900	7	210	24.2	1009.0	0
2	100	5	260	21.6	1010.1	0
	700	1	11	19.0	1013.6	0
	1300	0		20.3	1013.6	0
	1900	3	128	16.3	1013.9	0
3	100	13	33	13.2	1018.2	0
	700	11	14	11.3	1021.9	0
	1300	6	43	13.0	1021.5	0
	1900	3	100	12.2	1020.7	0
4	100	0		10.1	1023.1	0
	700	7	16	12.6	1025.9	0
	1300	4	113	14.6	1026.0	0
	1900	5	163	13.2	1022.7	0
5	100	7	220	16.1	1022.0	0
	700	7	238	16.3	1022.9	0
	1300	6	236	24.7	1020.4	0
	1900	8	217	20.7	1017.8	0
6	100	9	228	18.4	1018.8	0
	700	9	236	19.1	1019.1	0
	1300	4	258	26.4	1017.1	0
	1900	5	203	24.1	1016.9	0
7	100	5	227	20.3	1014.9	0
	700	6	240	21.0	1013.9	0
	1300	5	245	29.1	1012.5	0
	1900	5	146	18.9	1010.7	0
8	100	4	220	22.1	1008.9	0
	700	3	333	19.9	1009.9	0
	1300	5	42	16.6	1012.0	0
	1900	3	63	15.3	1012.8	0
9	100	10	45	14.5	1014.7	0
	700	13	33	11.8	1018.5	0
	1300	13	29	12.3	1020.7	0
	1900	12	34	10.6	1022.0	0
10	100	11	19	10.7	1021.4	0
	700	14	24	11.1	1021.4	0
	1300	10	27	13.9	1020.9	0
	1900	9	39	12.3	1018.9	0
11	100	3	344	10.4	1017.0	0
	700	4	294	13.1	1017.1	0
	1300	4	121	18.7	1013.9	0
	1900	6	112	15.5	1013.7	0
12	100	8	74	14.2	1014.8	0
	700	8	60	13.1	1015.8	0
	1300	7	48	13.3	1016.7	0
	1900	2	74	13.3	1016.7	0
13	100	6	71	12.9	1016.8	0
	700	6	69	13.9	1018.5	0
	1300	7	44	13.4	1019.7	0
	1900	7	46	12.5	1019.2	0
14	100	5	62	13.4	1019.1	0
	700	5	61	14.1	1020.7	0
	1300	6	54	14.4	1021.5	0
	1900	5	68	14.6	1021.5	0
15	100	1	96	14.7	1021.8	0
	700	3	96	15.5	1023.5	0
	1300	0		18.8	1024.3	0
	1900	0		16.7	1024.0	0
16	100	1	147	15.9	1023.3	0
	700	1	212	19.4	1023.9	0
	1300	4	148	22.4	1025.7	0
	1900	5	186	23.1	1019.6	0

TABLE 2: METEOROLOGICAL DATA

PART 2

MAY 1956

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	5	218	20.4	1018.8	0
	700	5	238	20.6	1018.2	0
	1300	4	247	27.8	1017.3	0
	1900	6	209	25.1	1016.0	0
18	100	7	229	21.1	1016.5	0
	700	6	232	21.6	1018.0	0
	1300	4	206	29.1	1017.1	0
	1900	5	200	24.0	1015.4	0
19	100	4	215	21.3	1017.1	0
	700	3	185	23.3	1017.8	0
	1300	5	180	25.9	1017.2	0
	1900	4	187	23.2	1008.3	0
20	100	4	191	21.9	1005.4	0
	700	4	191	22.7	1014.2	0
	1300	5	175	22.7	1014.0	5
	1900	6	191	21.2	1012.3	0
21	100	1	202	21.7	1012.4	0
	700	2	130	16.1	1011.7	7
	1300	2	145	20.7	1012.2	0
	1900	4	131	17.0	1010.8	8
22	100	0		17.7	1009.2	0
	700	0		17.3	1010.5	0
	1300	4	7	18.7	1010.6	0
	1900	2	70	17.4	1011.5	0
23	100	3	277	18.9	1012.4	0
	700	5	288	17.3	1014.5	0
	1300	3	57	19.1	1015.2	0
	1900	3	123	18.4	1015.8	0
24	100	2	212	21.6	1016.3	0
	700	6	228	20.4	1016.8	0
	1300	5	59	20.1	1016.5	0
	1900	0		18.9	1016.6	0
25	100	0		19.0	1017.2	0
	700	0		21.2	1017.8	0
	1300				1016.8	0
	1900				1016.5	0
26	100				1016.6	0
	700				1017.8	0
	1300	0		21.6	1019.9	0
	1900	7	59	17.2	1019.5	0
27	100	4	59	16.4	1020.4	0
	700	0		17.9	1021.0	0
	1300	0		20.1	1021.1	0
	1900	3	112	17.8	1019.6	0
28	100	1	206	18.9	1018.7	0
	700	5	250	22.1	1017.8	0
	1300	4	252	27.0	1015.4	0
	1900	0		21.4	1014.0	0
29	100	0		22.2	1015.3	0
	700	1	325	24.4	1015.3	0
	1300	0		24.7	1015.8	0
	1900	0		21.6	1014.3	0
30	100	0		23.1	1016.0	0
	700	0		23.6	1013.3	0
	1300	5	142	28.5	1012.6	0
	1900	6	200	25.6	1010.8	0
31	100	4	225	24.2	1010.0	0
	700	5	237	24.3	1009.8	0
	1300	2	64	27.2	1010.1	0
	1900	4	124	24.0	1009.5	0

III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage Nos. 625 and 645) and Waverider buoys (CERC gage Nos. 630 and 640, Table 1 and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20- minute records.

Wave height (H_{mo}) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period (T_p) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the H_{mo} and T_p values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA

PART 1

MAY 1986

GAGE		645		625		640		630	
DAY	TIME	Baylor	at 7+80 Hmo(m)	Baylor	at 19+00 Hmo(m)	Nearshr	Wvrdr Hmo(m)	Farshr	Wvrdr Hmo(m)
			T(sec)		T(sec)		T(sec)		T(sec)
1	1	.29	9.75	.47	6.87	.52	7.42	.52	7.42
	7	*		.47	6.40	.46	14.22	.51	6.87
13				.41	14.22	.45	14.22	.53	7.42
19		.28	16.79	.54	16.79	.44	12.34	.60	14.22
2	1	*		.32	16.79	.36	16.79	.39	16.79
	7	.37	16.79	.40	16.79	.38	16.79	.44	8.06
13		.29	8.83	.41	8.83	.42	8.06	.50	8.83
19		.22	16.79	.39	8.83	.39	7.42	.46	7.42
3	1	1.33	4.76	1.27	5.31	1.44	5.02	1.45	4.76
	7	1.34	5.63	1.41	5.99	1.40	5.31	1.83	5.63
13		.84	5.99	.96	5.99	.95	6.40	1.21	5.99
19		.39	5.02	.52	5.63	.57	5.02	.64	5.31
4	1	.36	5.31	.46	5.63	.46	5.99	.52	5.99
	7	.61	3.64	.68	3.38	.68	3.26	.63	5.63
13		.47	5.63	.68	5.31	.70	5.31	.78	5.63
19		.35	12.34	.52	3.51	.54	8.83	.66	3.64
5	1	.25	14.22	.51	6.40	.34	8.83	.49	10.89
	7	.19	14.22	.37	8.83	.30	8.83	.39	8.83
13		.25	10.89	.32	8.83	.28	9.75	.31	8.83
19		*		.40	8.83	.35	12.34	*	
6	1	.32	4.32	.44	12.34	.30	12.34	.44	4.76
	7	.24	5.63	.32	8.83	.31	14.22	.39	8.06
13		*		.39	8.06	.32	8.83	.41	5.31
19		.25	6.40	.35	14.22	.33	12.34	.37	6.40
7	1	*		.38	12.34	.29	14.22	.40	14.22
	7	*		.29	12.34	.29	12.34	.30	12.34
13		*		.30	12.34	.28	12.34	.38	4.32
19		.27	5.63	*		.30	12.34	.36	12.34
8	1	*		.31	8.83	.31	12.34	.57	3.38
	7	*		.43	3.15	.49	3.38	.92	4.53
13		.45	4.32	.84	4.53	.85	4.32	.88	4.32
19		.55	4.53	.80	5.31	.79	5.63	1.21	5.99
9	1	.92	5.02	1.02	4.32	1.01	5.31	2.57	8.06
	7	1.41	6.87	2.17	6.40	2.33	6.40	2.68	9.75
13		1.14	5.31	2.62	10.89	2.66	10.89	2.57	10.89
19		1.60	10.89	2.57	10.89	2.70	10.89	2.00	9.75
10	1	1.19	10.89	2.63	12.34	2.69	12.34	2.69	12.34
	7	1.35	12.34	3.00	12.34	3.20	12.34	3.09	12.34
13		1.41	16.79	2.88	14.22	3.24	14.22	3.28	14.22
19		1.89	16.79	2.94	14.22	3.26	16.79	2.82	14.22
11	1	1.42	16.79	2.68	16.79	2.61	16.79	2.41	14.22
	7	1.30	12.34	2.37	14.22	2.75	14.22	2.15	14.22
13		1.47	14.22	2.12	14.22	2.30	14.22	1.83	14.22
19		1.25	12.34	1.82	14.22	2.22	14.22	2.00	9.75
12	1	1.34	6.40	2.29	12.34	1.96	14.22	1.85	12.34
	7	1.25	12.34	1.85	12.34	1.97	10.89	1.78	10.89
13		1.13	12.34	1.80	12.34	2.04	12.34	1.79	12.34
19		1.47	12.34	2.03	14.22	2.24	12.34	1.92	12.34
13	1	1.31	14.22	2.11	14.22	2.15	14.22	2.16	12.34
	7	1.60	14.22	2.64	14.22	2.85	12.34	2.15	12.34
13		1.31	14.22	2.11	12.34	2.03	14.22	1.84	12.34
19		1.18	12.34	1.81	12.34	1.87	14.22	1.71	12.34
14	1	.99	12.34	1.55	14.22	1.63	14.22	1.79	14.22
	7	1.28	12.34	1.58	12.34	1.60	12.34	1.40	14.22
13		.79	12.34	1.28	12.34	1.31	12.34	1.32	12.34
19		.80	12.34	1.40	12.34	1.53	12.34	1.33	12.34
15	1	.66	12.34	1.22	12.34	1.28	12.34	1.23	12.34
	7	.64	12.34	1.18	12.34	1.13	12.34	1.05	12.34
13		.47	12.34	.97	12.34	1.00	12.34	.96	12.34
19		.45	10.89	.99	12.34	1.10	12.34	1.07	10.89
16	1	.63	10.89	.92	10.89	.95	10.89	.98	12.34
	7	.51	10.89	.91	10.89	.97	10.89	.91	10.89
13				.73	10.89	.85	10.89	.74	10.89
19		.45	10.89	.87	9.75	.76	9.75	.79	9.75

*=Electronic problems

TABLE 3: WAVE DATA

PART 2

MAY 1986

GAGE		645		625		640		630	
DAY	TIME	Baylor at 7+80 Hmo(m)	T(sec)	Baylor at 19+00 Hmo(m)	T(sec)	Nearshtr Wvrdr Hmo(m)	T(sec)	Farshtr Wvrdr Hmo(m)	T(sec)
17	1	.36	10.89	.62	10.89	.62	10.89	.79	9.75
	7	.40	9.75	.68	9.75	.50	9.75	.68	9.75
	13	*		.49	9.75	.56	8.83	.54	9.75
18	1	.33	9.75	.83	9.75	.47	9.75	.55	9.75
	7	.27	9.75	.48	9.75	.48	9.75	.53	8.83
	13	*		.43	9.75	.36	8.83	.46	9.75
	19	*		.36	8.83	.40	8.06	.42	8.83
19	1	.23	8.06	.87	8.83	.43	8.83	.54	8.83
	7			.43	8.83	.38	10.89	.42	8.06
	13	*		.41	9.75	.41	8.83	.49	8.06
	19	*		.55	8.06	.48	8.83	.50	8.83
20	1	.46	5.02	.57	9.75			.46	9.75
	7	.63	5.99	.74	8.83	*		.26	5.02
	13	.59	5.31	.85	5.99			*	
	19	.60	5.31	.79	8.83			.67	5.99
21	1	.69	6.40	.80	5.31	.72	4.53	.79	5.63
	7	.61	6.87	.72	6.40	.73	5.99	.62	5.99
	13	.50	6.40	.86	9.75	.75	6.40	1.00	6.87
	19	.45	7.42	.53	9.75	.66	6.40	.79	6.87
22	1	.59	6.40	.90	6.40	.61	6.40	.76	5.99
	7	.47	5.99	.65	5.31	.68	6.87	.89	6.87
	13	.77	6.40	.73	6.40	.65	7.42	.85	6.40
	19	.51	6.40	.66	6.40	.67	6.87	.75	5.63
23	1	.50	5.99	.62	6.40	.53	6.87	.74	6.87
	7	.30	7.42	.47	6.87	.45	7.42	.59	6.40
	13	.32	5.63	.45	6.87	.43	6.87	.53	6.87
	19	.29	6.40	.39	6.87	.38	5.99	.51	6.87
24	1	.31	8.83	.40	8.83	.33	8.83	.46	6.87
	7			.31	8.83	.33	8.83	.36	6.87
	13	*		.49	8.06	.35	8.83	.40	8.06
	19	*		.37	8.06	.37	8.83	.38	6.40
25	1	.29	8.83	.38	8.83	.34	8.83	.40	6.87
	7			.38	8.83	.41	12.34	.40	6.87
	13							.43	8.06
	19								
26	1			Software error					
	7								
	13	*		.55	8.83	.47	8.83	.51	8.83
	19	*		.75	3.79	.79	3.79	.80	3.38
27	1	.73	9.75	1.21	8.06	1.28	8.83	1.39	8.06
	7	.83	8.83	1.36	8.83	1.38	8.06	1.41	8.83
	13	.67	9.75	1.13	8.06	1.17	9.75	1.02	6.87
	19	.72	9.75	1.42	10.89	1.45	10.89	1.14	9.75
28	1	.52	10.89	.87	10.89	.99	9.75	1.03	9.75
	7	.43	9.75	*		.97	9.75	.96	7.42
	13	.39	9.75	.75	9.75	.85	9.75	.82	9.75
	19	.45	10.89	*		.84	9.75	.72	8.83
29	1	*		.46	10.89	.65	9.75	.69	9.75
	7	.39	10.89	.42	9.75	.46	10.89	.52	8.83
	13	*		.25	9.75	.47	8.83	.40	9.75
	19	*		.24	9.75	.43	8.83	.43	8.83
30	1	.24	8.83	.17	10.89	.35	8.83	.33	8.83
	7	.24	10.89	.37	9.75	.36	9.75	.36	9.75
	13	.30	8.06	.35	8.83	.36	8.06	.37	8.83
	19	*		.50	9.75	.37	8.83	.41	7.42
31	1	*		.32	7.42	.27	7.42	.30	8.83
	7	*		.49	8.06	.28	8.06	.33	9.75
	13	*		*		.28	8.83	.33	8.06
	19	*		.33	8.06	.26	8.83	.28	8.06
MEAN		.68	9.75	.92	9.65	.93	9.86	.93	8.84
STD		.43	3.65	.71	3.10	.78	3.09	.69	2.98

*=Electronic problems

CERC Gage Number 630, Waverider 6 km from shore

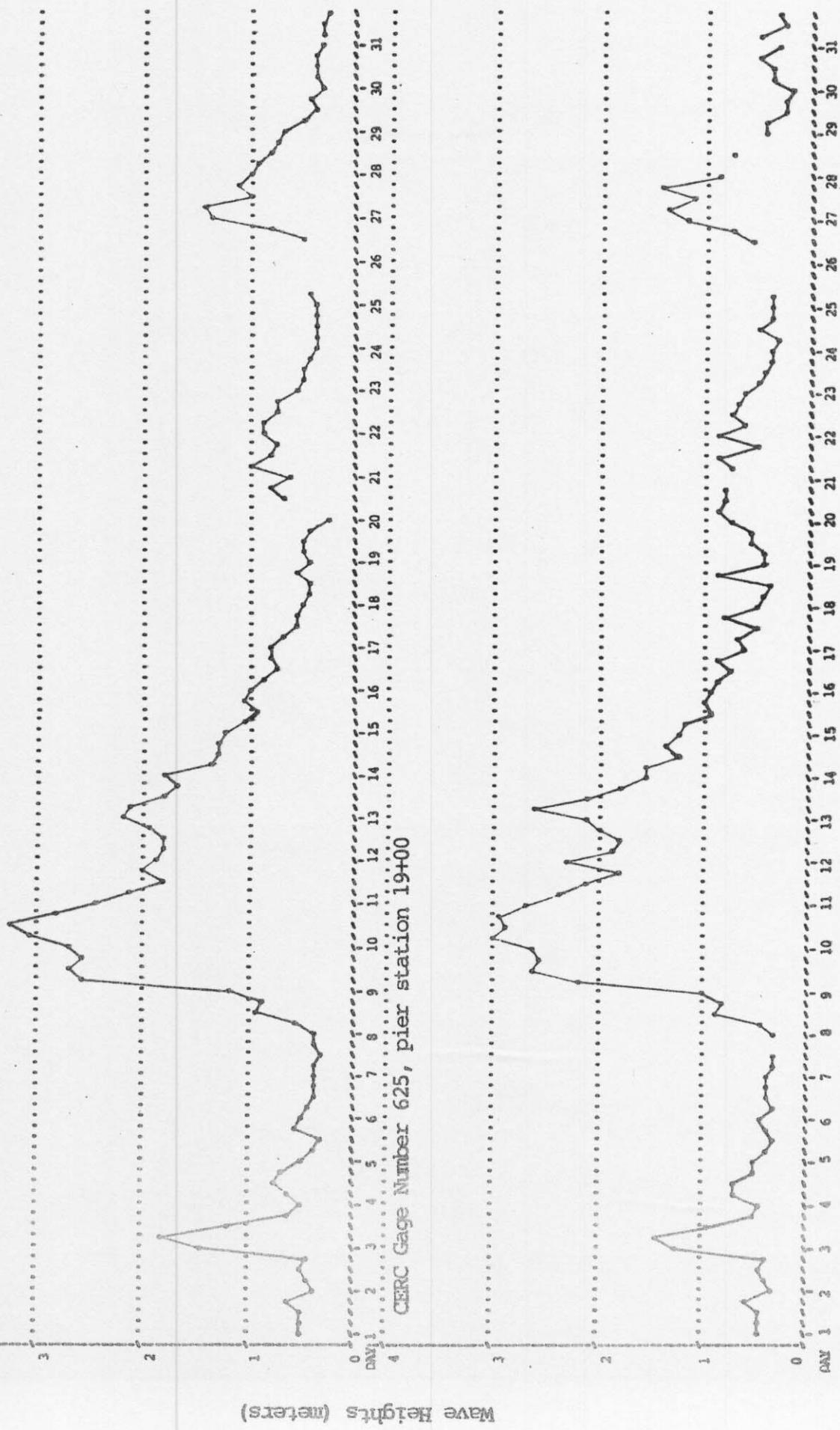


FIGURE 3. Time History of Wave Heights and Periods - May 1986

Part I: Heights

CERC Gage Number 630, Waverider 6 km from shore

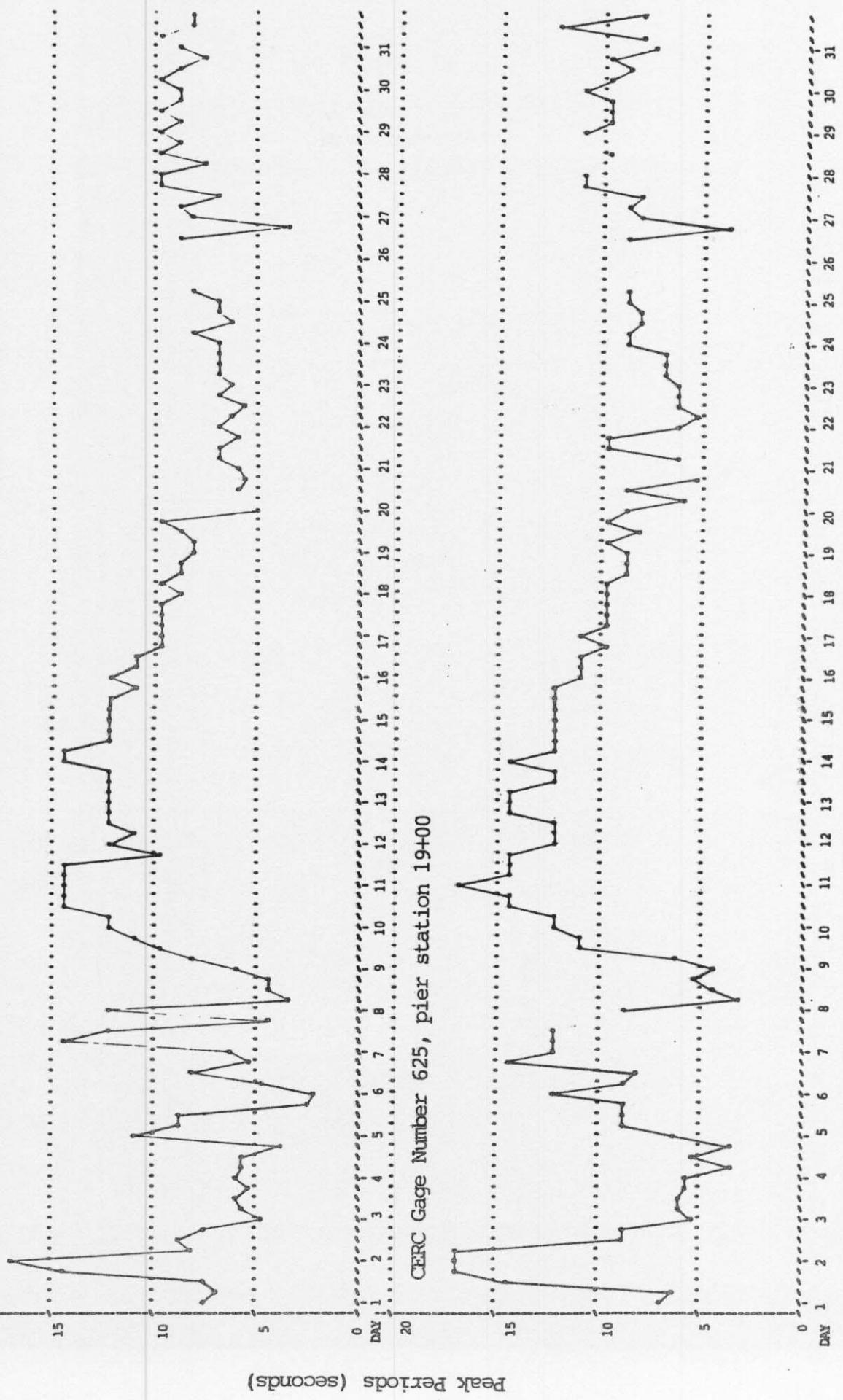


FIGURE 3. Time History of Wave Heights and Periods - May 1986
Part III: Periods

IV. CURRENT DATA

Current data (Table 4) are collected from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, alongshore currents flow either toward 340 (i.e. northward) or toward 160 (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

May 1986

DAY	TIME	PIER MEASUREMENTS			BEACH MEASUREMENTS (500 UPDRIFT)			CURRENT METER AT SOUTH TRIPOD		
		DYE AT 19400 (579m)	CURRENT METER AT 14+20(433m) (SURFACE)	DYE AT MID-SURF ZONE (SURFACE)	DYE 12M OFFSHORE DIST. FROM BASELINE(m)	DYE (SURFACE)	12M OFFSHORE (SURFACE)	(DEPTH -4.8m MSL)	I.D.-6679	
1	0100-Alongshore		0						8	S
	Cross-shore		2	DF					5	DF
	Resultant		2	70					2	122
1	0700-Alongshore	8 N	3	S		0 0		23 N	8	6
	Cross-shore	16 Off	1	DF	131	3 Off	South		6	DF
	Resultant	18 43	3	146		3 70			10	124
1	1300-Alongshore		2	S					5	S
	Cross-shore		1	DF					4	DF
	Resultant		2	145					6	124
1	1900-Alongshore		3	N					7	6
	Cross-shore		3	DF					3	DF
	Resultant		4	27					8	137
2	0100-Alongshore		1	S					2	S
	Cross-shore		0						2	DF
	Resultant		1	160					2	114
2	0700-Alongshore	6 S	5	S		0 0		3 S	12	6
	Cross-shore	1 Off	2	DF	128	0 0	North		5	DF
	Resultant	6 151	5	136		0 0			13	136
2	1300-Alongshore		0						3	N
	Cross-shore		3	DF					5	DF
	Resultant		3	70					6	53
2	1900-Alongshore		4	S					8	6
	Cross-shore		0						2	DF
	Resultant		4	160					9	145
3	0100-Alongshore		16	S					27	6
	Cross-shore		3	ON					5	DF
	Resultant		16	170					28	151
3	0700-Alongshore	76 S	15	S		102 S		25 S	36	5
	Cross-shore	0 0	4	DN	237	0 0	North		6	DF
	Resultant	76 160	16	173		102 160			37	151
3	1300-Alongshore		10	S					33	6
	Cross-shore		2	DN					5	DF
	Resultant		10	173					33	152
3	1900-Alongshore		6	S					21	5
	Cross-shore		1	DF					5	DF
	Resultant		7	148					21	147
4	0100-Alongshore		2	S					9	S
	Cross-shore		4	DF					8	DF
	Resultant		4	100					12	116
4	0700-Alongshore	38 S	7	S		41 S		38 S	21	6
	Cross-shore	0 0	1	DF	164	6 On	North		2	DF
	Resultant	38 160	7	156		41 169			21	154
4	1300-Alongshore		9	S					15	6
	Cross-shore		3	DF					7	DF
	Resultant		9	143					17	135
4	1900-Alongshore		3	N					1	N
	Cross-shore		4	DF					5	DF
	Resultant		5	36					5	56
5	0100-Alongshore		4	N					16	N
	Cross-shore		4	DF					0	
	Resultant		6	22					16	340
5	0700-Alongshore	34 N	4	N		8 N		17 N	3	N
	Cross-shore	23 Off	3	DF	125	6 Off	South		2	DF
	Resultant	41 15	5	20		10 15			3	12
5	1300-Alongshore		3	N					7	N
	Cross-shore		4	DF					0	
	Resultant		5	28					7	340
5	1900-Alongshore		0						5	N
	Cross-shore		3	DF					1	ON
	Resultant		3	29					5	329
6	0100-Alongshore		4	N					11	N
	Cross-shore		5	DF					1	DF
	Resultant		7	28					11	343
6	0700-Alongshore	17 N	0			11 N		23 N	6	N
	Cross-shore	15 Off	3	DF	126	7 Off	South		2	ON
	Resultant	23 22	3	70		12 13			6	326
6	1300-Alongshore		1	N					10	N
	Cross-shore		4	DF					1	DF
	Resultant		4	61					10	345
6	1900-Alongshore		6	N					8	N
	Cross-shore		8	DF					8	DF
	Resultant		10	33					11	24

KEY = ALL SPEEDS IN CM/SEC
N =NORTHWARD, SHORE PARALLEL
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ON=ONSHORE
OF=OFFSHORE

TIME	PIEB MEASUREMENTS			BEACH MEASUREMENTS (500 UPDRIFT)			CURRENT METER AT SOUTH TRIPOD		
	DYE AT 19400 (579m)	CURRENT METER AT 14420(433m) (I.D. 6639) (SURFACE)	DYE AT MID-SURF ZONE (DEPTH -4.2m MSL) (DIST. FROM SURFACE)	DYE 12M OFFSHORE (SURFACE)	12M OFFSHORE (DEPTH -4.8m MSL)	I.D. 6679	SPEED	LOCATION	SPEED
0100-Alongshore	0						1	N	
Cross-shore	3	OF					2	OF	
Resultant	3	Z0					3	Z1	
0700-Alongshore	17 N	0		4 N			4	6	
Cross-shore	13 Off	3 OF	125	5 Off	South	2 N	1	OF	
Resultant	22 17	3 Z0		6 31			4	132	
1300-Alongshore	0						0		
Cross-shore	3	OF					2	OF	
Resultant	3	Z0					2	Z0	
1900-Alongshore	0						4	6	
Cross-shore	2	OF					2	OF	
Resultant	2	Z0					4	128	
0100-Alongshore	1	6					5	S	
Cross-shore	3	OF					6	OF	
Resultant	3	Z2					6	112	
0700-Alongshore	3 S	0		10 S		29 S	5	S	
Cross-shore	6 On	6 OF	126	15 On	North	5	OF		
Resultant	7 226	6 Z0		19 216			7	117	
1300-Alongshore	5 S						9	OF	
Cross-shore	2 OF						12	192	
Resultant	5 133						2	6	
1900-Alongshore	1 N						1	ON	
Cross-shore	4 OF						2	182	
Resultant	4 Z7						18	S	
0100-Alongshore	7 S						5	OF	
Cross-shore	1 OF						18	145	
Resultant	7 123						49	S	
0700-Alongshore	55 S	29	6	152 S		55 S	49	S	
Cross-shore	6 Off	2 ON	176	46 Off	North	7	OF		
Resultant	56 154	29 165	159 143				49	152	
1300-Alongshore	33 S						60	S	
Cross-shore	11 OF						9	OF	
Resultant	35 142						61	151	
1900-Alongshore	35 S						50	S	
Cross-shore	0						5	OF	
Resultant	35 160						50	155	
0100-Alongshore	25 S						45	S	
Cross-shore	6 ON						7	OF	
Resultant	25 123						45	151	
0700-Alongshore	76 S	32	S	87 S		34 S	57	S	
Cross-shore	4 On	2 OF	310	9 On	North	11	OF		
Resultant	76 163	32 156		88 166			58	142	
1300-Alongshore	34 S						48	S	
Cross-shore	19 OF						14	OF	
Resultant	32 130						50	144	
1900-Alongshore	50 S						40	S	
Cross-shore	61 OF						1	OF	
Resultant	72 107						40	158	
0100-Alongshore	25 S						19	S	
Cross-shore	39 OF						8	OF	
Resultant	46 103						21	132	
0700-Alongshore	8 S	10	S	0 0		27 N	10	N	
Cross-shore	6 On	10 OF	237	32 Off	North	10	OF		
Resultant	10 195	14 114		32 70			14	22	
1300-Alongshore	12 S						8	N	
Cross-shore	24 OF						3	OF	
Resultant	27 97						2	3	
1900-Alongshore	17 S						25	N	
Cross-shore	38 OF						8	OF	
Resultant	41 94						26	357	
0100-Alongshore	6 S						7	N	
Cross-shore	17 OF						2	OF	
Resultant	18 89						7	358	
0700-Alongshore	0 0	28	S	14 S		33 S	0		
Cross-shore	12 On	55 OF	252	0 0	North	0			
Resultant	12 250	61 97		14 160			1	0	
1300-Alongshore	6 S						24	S	
Cross-shore	1 OF						5	OF	
Resultant	8 153						25	148	
1900-Alongshore	11 S						16	S	
Cross-shore	21 OF						4	OF	
Resultant	23 98						17	146	

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PIER MEASUREMENTS				BEACH MEASUREMENTS (500 UPDRIFT)				CURRENT METER			
DYE AT	CURRENT METER	DYE AT MID-SURF ZONE	DYE	AT SOUTH TRIPOD							
19400	AT 14420(433m)	(SURFACE)	12M OFFSHORE	(DEPTH -4.8m MSL)							
(579m)	I.D. 0639	(DEPTH -4.2m MSL)	DIST. FROM	(SURFACE)							
DAY	TIME	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	BASELINE(M)	SPEED
13	0100-Alongshore	21	S					16	S		
	Cross-shore	25	OF					8	OF		
	Resultant	33	111					18	134		
13	0700-Alongshore	9	S	26	S	0	0	6	N	13	S
	Cross-shore	2	On	51	OF	298	66	Off	South	6	DF
	Resultant	9	174	59	77	66	70			14	137
13	1300-Alongshore	16	S							29	S
	Cross-shore	15	OF							13	DF
	Resultant	21	117							32	136
13	1900-Alongshore	10	S							30	S
	Cross-shore	4	OF							13	DF
	Resultant	11	139							33	136
14	0100-Alongshore	11	S							24	S
	Cross-shore	3	OF							10	DF
	Resultant	11	146							26	137
14	0700-Alongshore	23	S	5	S			53	N	10	S
	Cross-shore	15	On	6	OF	237	8	On	North	4	DF
	Resultant	128	193	8	119	12	205			11	136
14	1300-Alongshore	10	S							13	S
	Cross-shore	1	ON							4	DF
	Resultant	19	165							13	143
14	1900-Alongshore	6	S							11	S
	Cross-shore	3	OF							3	DF
	Resultant	7	131							11	144
15	0100-Alongshore	4	S							19	S
	Cross-shore	3	OF							5	DF
	Resultant	5	123							12	135
15	0700-Alongshore	10	S	1	S			35	S	14	S
	Cross-shore	6	On	2	OF	214	3	S		6	DF
	Resultant	11	191	2	87	1	OFF	North		15	132
15	1300-Alongshore	1	S							8	S
	Cross-shore	3	OF							2	DF
	Resultant	3	83							9	143
15	1900-Alongshore	4	S							14	S
	Cross-shore	1	OF							3	DF
	Resultant	4	150							14	146
16	0100-Alongshore	0								13	S
	Cross-shore	1	OF							2	DF
	Resultant	1	70							13	133
16	0700-Alongshore	30	S	8	S			53	S	16	S
	Cross-shore	2	On	4	OF	167	5	S		6	DF
	Resultant	31	163	2	134	11	Off	North		19	142
16	1300-Alongshore	6	S							16	S
	Cross-shore	2	OF							4	DF
	Resultant	6	137							16	144
16	1900-Alongshore	3	S							1	DF
	Cross-shore	3	OF							1	7
	Resultant	4	114							1	155
17	0100-Alongshore	3	N							6	N
	Cross-shore	3	DF							3	OF
	Resultant	4	31							6	5
17	0700-Alongshore	18	N	2	N			13	N	8	N
	Cross-shore	15	Off	5	OF	162	10	N		1	DF
	Resultant	24	20	5	59	17	Off	South		8	347
17	1300-Alongshore	5	N							5	N
	Cross-shore	7	OF							4	DF
	Resultant	9	33							6	19
17	1900-Alongshore	5	N							8	N
	Cross-shore	6	OF							2	DF
	Resultant	8	32							9	356
18	0100-Alongshore	2	N							7	N
	Cross-shore	6	OF							3	DF
	Resultant	6	54							8	4
18	0700-Alongshore	7	N	1	N			13	S	4	N
	Cross-shore	13	Off	7	OF	126	8	N		1	DF
	Resultant	15	43	7	63	4	Off	North		4	350
18	1300-Alongshore	1	N							2	N
	Cross-shore	5	OF							1	DF
	Resultant	8	63							2	359
18	1900-Alongshore	8	N							15	N
	Cross-shore	9	OF							8	DF
	Resultant	12	28							17	S

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PIER MEASUREMENTS				BEACH MEASUREMENTS (500 UPDRIFT)			
	DYE AT	CURRENT METER		DYE AT MID-SURF ZONE		CURRENT METER	
	19+00 (579m)	AT 14+20(433m) (SURFACE) (DEPTH -4.2m MSL)	I.D. #639	(SURFACE)	DIST. FROM	AT SOUTH TRIPOD 12M OFFSHORE (SURFACE)	(DEPTH -4.8m MSL) I.D. #679
MAY	TIME	SPEED	DIB	SPEED	DIB	LOCATION	SPEED
19	0100-Alongshore	0		18	BASELINE (0)		1 DIB
	Cross-shore	7	OF				0
	Resultant	7	ZD				340
19	0700-Alongshore	17	N	2	6		
	Cross-shore	4	Off	7	OF	15 N	
	Resultant	18	354	7	82	5 Off	
						16 354	
							30 N
19	1300-Alongshore	2	N				
	Cross-shore	7	OF				
	Resultant	7	54				7 N
							1 OF
19	1900-Alongshore	1	N				
	Cross-shore	7	OF				0
	Resultant	7	77				10 N
							10 340
20	0100-Alongshore	1	N				
	Cross-shore	7	OF				9 N
	Resultant	7	60				0
							9 340
20	0700-Alongshore	27	N	4	N		
	Cross-shore	8	Off	8	OF	41 N	
	Resultant	28	357	9	46	167	
							4 Off
							41 346
							76 N
20	1300-Alongshore	44	S				
	Cross-shore	14	OF				
	Resultant	46	143				11 N
							2 OF
20	1900-Alongshore	4	N				
	Cross-shore	9	OF				
	Resultant	10	47				11 350
							12 OF
21	0100-Alongshore	1	N				
	Cross-shore	8	OF				10 N
	Resultant	8	62				1 OF
							10 343
21	0700-Alongshore	36	N	4	N		
	Cross-shore	4	On	3	OF	29 N	
	Resultant	36	334	5	16	163	
							1 Off
							29 343
							54 N
21	1300-Alongshore	4	N				
	Cross-shore	9	OF				
	Resultant	10	46				6 N
							1 OF
21	1900-Alongshore	1	N				
	Cross-shore	2	OF				
	Resultant	3	44				1 OF
							3 50
22	0100-Alongshore	8	N				
	Cross-shore	3	OF				
	Resultant	8	4				2 N
							4 OF
22	0700-Alongshore	0	O	1	S		
	Cross-shore	2	On	3	OF	44 N	
	Resultant	2	250	3	21	142	
							11 Off
							45 354
							94 N
22	1300-Alongshore	1	S				
	Cross-shore	2	OF				
	Resultant	2	29				2 S
							5 OF
22	1900-Alongshore	1	S				
	Cross-shore	2	OF				
	Resultant	2	94				6 S
							5 OF
23	0100-Alongshore	3	S				
	Cross-shore	2	OF				
	Resultant	4	122				10 S
							4 OF
23	0700-Alongshore	76	S	4	S		
	Cross-shore	4	Off	0		5 S	
	Resultant	76	157	4	160	125	
							3 Off
							6 127
							North
							7 S
23	1300-Alongshore	6	S				
	Cross-shore	4	OF				
	Resultant	7	124				21 S
							6 OF
23	1900-Alongshore	3	S				
	Cross-shore	0	OF				
	Resultant	3	160				7 S
							5 OF
24	0100-Alongshore	2	S				
	Cross-shore	1	OF				
	Resultant	2	133				9 S
							2 OF
24	0700-Alongshore	13	S	2	S		
	Cross-shore	13	Off	3	OF	5 N	
	Resultant	18	115	3	100	119	
							1 Off
							5 349
							South
24	1300-Alongshore	2	S				
	Cross-shore	3	OF				
	Resultant	4	95				11 S
							8 OF
24	1900-Alongshore	1	S				
	Cross-shore	2	OF				
	Resultant	3	103				14 126
							2 OF
							3 21

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DAY	TIME	PIER MEASUREMENTS				BEACH MEASUREMENTS (500 UPDRIFT)				CURRENT METER			
		DYE AT 19400 (579m)	CURRENT METER AT 14:20(433m) (I.D. 6639 (SURFACE)) (DEPTH -4.2m MSL)	DYE AT MID-SURF ZONE (SURFACE) DIST. FROM 12M OFFSHORE (SURFACE)	DYE 12M OFFSHORE (DEPTH -4.8m MSL) (I.D. 6679)	BASELINE(M)	LOCATION	SPEED	DIR	BASELINE(M)	LOCATION	SPEED	DIR
25	0100-Alongshore												
	Cross-shore		2	6									
	Resultant		4	OF									
25	0700-Alongshore	47	S	3	6								
	Cross-shore	5	Off	2	ON	128		0	0	37	N	13	S
	Resultant	47	154	3	124			0	0			5	OF
25	1300-Alongshore												
	Cross-shore												
	Resultant												
25	1900-Alongshore												
	Cross-shore												
	Resultant												
26	0100-Alongshore												
	Cross-shore												
	Resultant												
26	0700-Alongshore	27	S										
	Cross-shore	8	On					0	0				
	Resultant	28	177			125		0	0	North	2	N	
26	1300-Alongshore												
	Cross-shore												
	Resultant												
26	1900-Alongshore												
	Cross-shore												
	Resultant												
27	0100-Alongshore												
	Cross-shore												
	Resultant												
27	0700-Alongshore	21	S	3	S								
	Cross-shore	5	On	4	OF			44	S				
	Resultant	22	174	4	195	176		7	On	North	57	S	
								44	169				
27	1300-Alongshore												
	Cross-shore												
	Resultant												
27	1900-Alongshore												
	Cross-shore												
	Resultant												
28	0100-Alongshore												
	Cross-shore												
	Resultant												
28	0700-Alongshore	3	N	2	N								
	Cross-shore	1	Off	2	OF			30	S				
	Resultant	3	359	3	28	152		37	Off	South	15	N	
								48	110				
28	1300-Alongshore												
	Cross-shore												
	Resultant												
28	1900-Alongshore												
	Cross-shore												
	Resultant												
29	0100-Alongshore												
	Cross-shore												
	Resultant												
29	0700-Alongshore	7	N	2	N								
	Cross-shore	3	On	3	OF			20	N				
	Resultant	8	318	4	35	140		6	Off	South	0	0	
								21	357				
29	1300-Alongshore												
	Cross-shore												
	Resultant												
29	1900-Alongshore												
	Cross-shore												
	Resultant												
30	0100-Alongshore												
	Cross-shore												
	Resultant												
30	0700-Alongshore	68	S	7	S								
	Cross-shore	7	On	4	OF			9	S				
	Resultant	68	166	8	128	128		1	Off	North	7	S	
								9	151				
30	1300-Alongshore												
	Cross-shore												
	Resultant												
30	1900-Alongshore												
	Cross-shore												
	Resultant												
31	0100-Alongshore												
	Cross-shore												
	Resultant												
31	0700-Alongshore	38	N	6	N								
	Cross-shore	11	Off	4	OF			5	N				
	Resultant	40	357	7	12	140		1	On	South	11	N	
								5	331				
31	1300-Alongshore												
	Cross-shore												
	Resultant												
31	1900-Alongshore												
	Cross-shore												
	Resultant												

KEY = ALL SPEEDS IN CM/SEC
 N =NORTHWARD, SHORE PARALLEL
 S =SOUTHWARD, SHORE PARALLEL
 ON=ONSHORE
 OF=OFFSHORE

V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is orientated 70 east of true north; consequently, wave angles greater than 70 imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

Table 5

SUPPLEMENTAL OBSERVATIONS

May 1986

DAY/TIME	WAVE APPROACH ANGLE AT PIER END (° from True N)		RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE (M)	WATER CHARACTERISTICS AT PIER END		
	PRIMARY	SECONDARY			TEMP (°C)	DENSITY (g/cc)	SECCI VIS (M)
1 0725	110		35	24	13.2	1.0215	2.4
2 0630	115			12	13.5	1.0222	3.0
3 0730	40		40	228	13.3	1.0206	1.5
4 0845	40			91	14.4	1.0206	3.0
5 0610	Calm			9	13.4	1.0206	3.3
6 0610	Calm			11	11.7	1.0248	4.2
7 0600	Calm			3	12.3	1.0246	4.6
8 0730	Calm			8	15.2	1.0228	4.9
9 0700	50		60	188	14.3	1.0230	1.2
10 0815	60		80	681	14.5	1.0202	.3
11 0830	70		75	328	14.0	1.0212	.3
12 0725	70		75	292	13.9	1.0218	.6
13 0710	80		70	379	14.3	1.0226	.3
14 0640	80		80	249	15.0	1.0203	1.5
15 0750	90		70	205	14.7	1.0209	1.5
16 0705	75		70	111	15.5	1.0212	1.8
17 0640	Calm			85	14.0	1.0232	1.5
18 0930	Calm			12	13.0	1.0242	1.8
19 0630	Calm			18	12.7	1.0246	2.4
20 0735	120			91	12.8	1.0248	2.1
21 0710	120			100	13.5	1.0238	3.3
22 0705	115			81	13.3	1.0248	2.1
23 0705	120	15		17	17.0	1.0209	2.4
24 0745	135			5	16.5	1.0220	3.6
25 0755	100			3	18.7	1.0204	4.6
26 0710	75			20	18.8	1.0205	3.9
27 0655	55		65	163	19.1	1.0202	2.4
28 0700	55			87	17.5	1.0216	2.7
29 0700	55			49	19.0	1.0214	3.0
30 0700	80			14	21.1	1.0198	3.0
31 0650	110			0	20.5	1.0210	3.3

VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865- 1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects on both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

FRF TIDE HEIGHTS

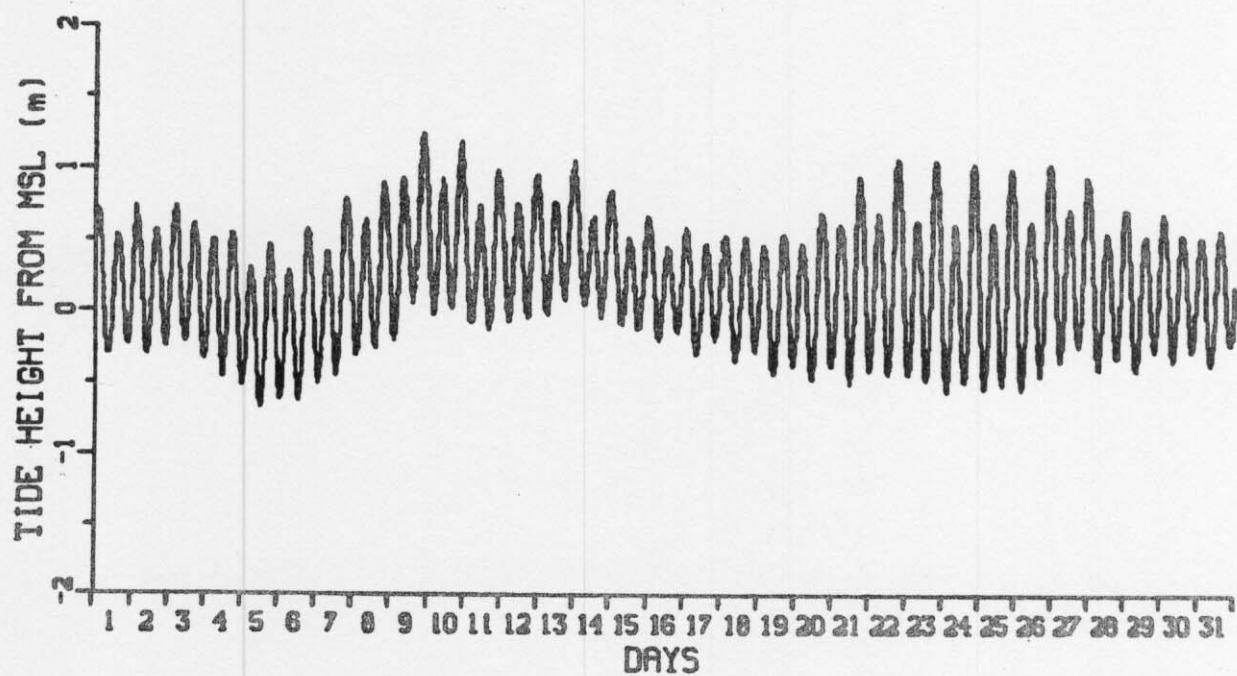


FIGURE 5. Time History of Mean Water Levels, May 1986 (Gage No. 865-1370)

MONTHLY MEAN WATER LEVELS (METERS MSL)

Extreme Low -	-.67 on 5 May at 1106 hrs.
Extreme High -	1.25 on 9 May at 1948 hrs.
Monthly Mean -	.20
Mean Low Water -	-.30
Mean High Water -	.78
Mean Range -	1.09

MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-0.30	0.71	0.19	1.02
1	1837	-0.24	0.57	0.16	0.81
2	703	-0.29	0.74	0.18	1.04
2	1928	-0.24	0.57	0.19	0.81
3	753	-0.21	0.73	0.23	0.94
3	2018	-0.33	0.61	0.13	0.93
4	843	-0.46	0.50	0.05	0.96
4	2109	-0.51	0.55	0.00	1.06
5	934	-0.67	0.30	-0.16	0.97
5	2159	-0.61	0.47	-0.09	1.08
6	1024	-0.62	0.44	-0.12	1.05
6	2249	-0.49	0.57	0.02	1.06
7	1115	-0.44	0.67	0.07	1.12
7	2340	-0.30	0.79	0.21	1.09
8	1205	-0.25	0.82	0.23	1.07
9	30	-0.20	0.90	0.36	1.09
9	1255	0.06	1.18	0.58	1.12
10	121	-0.02	1.25	0.56	1.26
10	1346	0.03	1.12	0.53	1.09
11	211	-0.07	1.19	0.44	1.26
11	1436	-0.12	0.99	0.36	1.11
12	301	-0.06	0.93	0.39	0.99
12	1527	-0.04	0.94	0.41	0.98
13	352	-0.02	0.96	0.44	0.98
13	1617	0.09	0.99	0.52	0.91
14	442	0.05	1.05	0.45	1.01
14	1707	-0.04	0.83	0.37	0.87
15	532	-0.09	0.84	0.30	0.93
15	1758	-0.12	0.66	0.23	0.78
16	623	-0.20	0.65	0.18	0.84
16	1848	-0.14	0.59	0.19	0.73
17	713	-0.30	0.57	0.10	0.86
17	1938	-0.20	0.53	0.16	0.73
18	804	-0.35	0.52	0.07	0.87
19	2029	-0.28	0.52	0.12	0.80
19	854	-0.43	0.53	0.03	0.96
19	2119	-0.38	0.54	0.09	0.92
20	944	-0.47	0.67	0.04	1.14
20	2210	-0.38	0.69	0.17	1.08
21	1035	-0.49	0.90	0.15	1.39
21	2300	-0.41	0.94	0.23	1.35
22	1125	-0.43	1.03	0.22	1.46
22	2350	-0.44	1.07	0.23	1.50
23	1216	-0.48	1.02	0.17	1.50
24	41	-0.55	1.06	0.16	1.61
24	1306	-0.49	1.01	0.15	1.50
25	131	-0.53	1.04	0.17	1.57
25	1356	-0.51	0.97	0.14	1.48
26	222	-0.54	1.00	0.16	1.54
26	1447	-0.44	1.01	0.17	1.45
27	312	-0.34	1.04	0.30	1.39
27	1537	-0.24	0.91	0.29	1.14
28	402	-0.40	0.94	0.21	1.34
28	1628	-0.32	0.65	0.15	0.97
29	453	-0.41	0.71	0.12	1.12
29	1718	-0.27	0.60	0.16	0.87
30	543	-0.34	0.69	0.15	1.02
30	1808	-0.27	0.54	0.14	0.89
31	634	-0.36	0.53	0.08	0.89

TABLE 6
WATER LEVELS (METERS MSL)
Tidal Characteristics

May 1986

VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 5 shows the last survey in April and the only survey taken during May on profile line 188, located 517 m south of the pier. The May survey shows the development of a berm (80 to 120 m) in addition to a small nearshore bar (120 to 180 m). Offshore a sharply defined storm bar (200 to 400 m) also re-developed. These changes to the profile followed a lengthy period (9-13 May) of high waves.

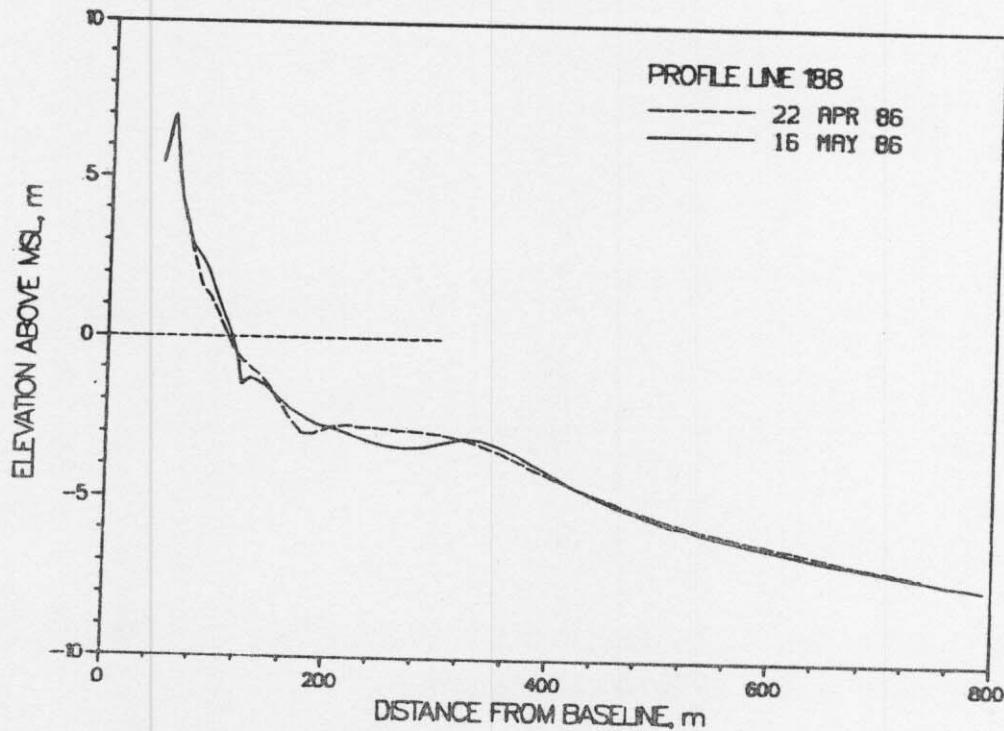


Figure 5. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 6) reflects the maximum changes which occurred on the profile between January and May. The envelope change (320 to 420 m) documents the development of the storm bar.

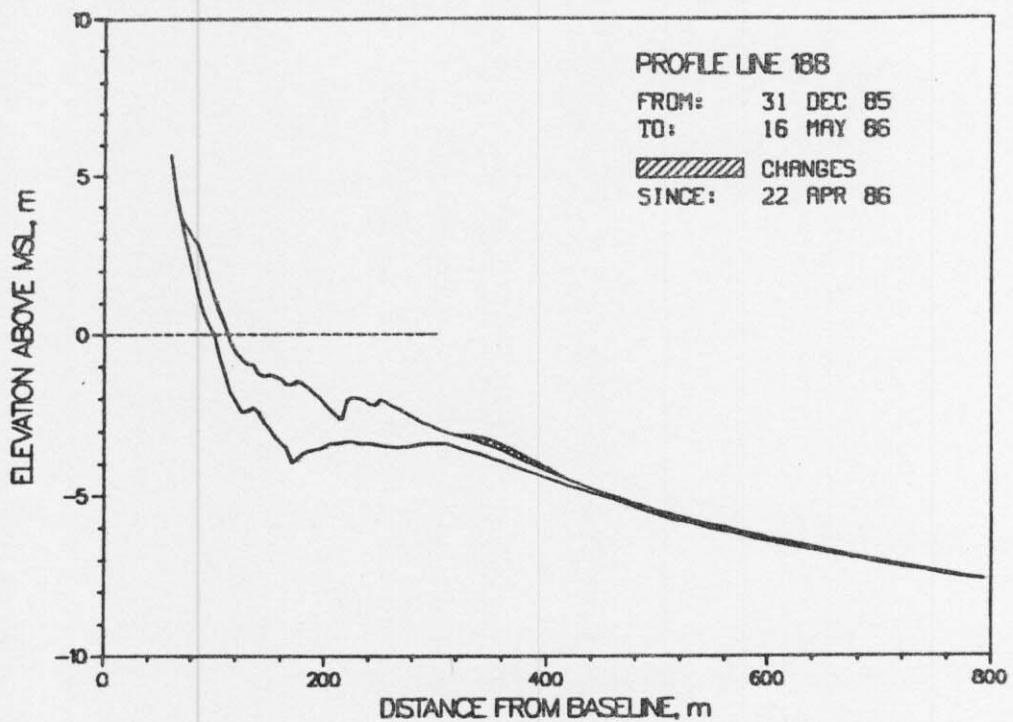


Figure 6. CRAB profile envelope - profile 188.

B. Bathymetry. No bathymetric survey was conducted in May. The last survey on 28 February 1986 (Figure 7) is included for reference.

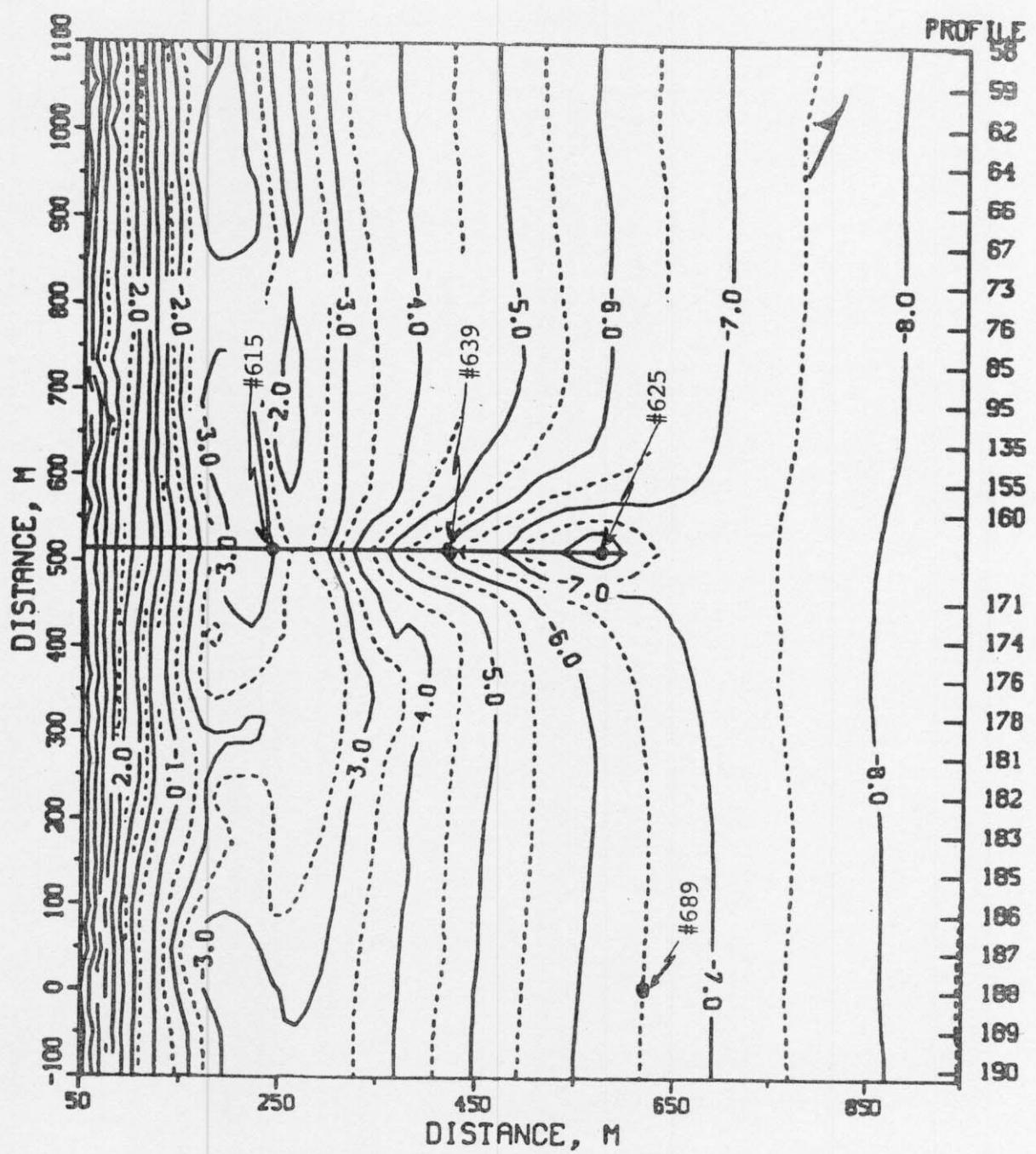


FIGURE 7.

FRF BATHYMETRY 28 FEB 86
CONTOURS IN METERS

VIII. SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by the Baylor gage #625 at pier station 19+00) exceeded 2 m and wave records were obtained every hour:

<u>Start</u>	<u>End</u>
9 May (0600)	12 May (0500)
12 May (1900)	13 May (1700)

B. Storm Synopsis.

9-13 May 1986 - Developing well out in the north Atlantic on 8 May, this storm in combination with a high pressure system in central Canada began to affect the FRF on the same day. As a result of its very slow movement, long period storm waves (up to 16 sec) were recorded through 13 May, well after local winds had subsided. Winds approached 14 m/s (NE) and the maximum Hmo (gage #625) of 3.10 m was recorded at 1800 hours on 10 May. The lowest barometric reading was 1008.9 mb at 0100 hours on 8 May. There was no precipitation.

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